TRANSCRANIAL ULTRASOUND STIMULATION (TUS) TOOLKIT

In-depth training and hands-on experience in Transcranial Ultrasonic Stimulation (TUS)

Date:	**11 – 13 June 2025**
Location:	**Donders Centre for Cognition** Thomas van Aquinostraat 4 6525 GD Nijmegen The Netherlands
Contact:	neuromod@donders.ru.nl

This 3-day course will provide you with in-depth knowledge about the non-invasive brain stimulation technique Transcranial Ultrasonic Stimulation (TUS).

In this toolkit will discuss physics, biomechanisms, protocols, study design, confounds, and effects on connectivity, plasticity, and circuits. The course is focused on hands-on training, catering to a wide diversity of expertise. The in-person training is complemented by an online educational videos, made available prior to the Toolkit.

Each day will start with informative lectures that provide an overview of the fundamental concepts, followed by practical training and demonstrations. On the third day, we will host a TUS symposium featuring presentations by leading experts from around the world. These talks will showcase the latest advancements in the field.

Wednesday, June 11: Foundations

09:00 – 09:10	Welcome and introduction *Lennart Verhagen*
09:10 – 09:30	TUS overview *Lennart Verhagen*
09:30 – 10:00	Biomechanisms *Joana Pedroso de Faria*
10:00 – 11:00	TUS effects, protocols, and confounds *Marwan Engels*
	Coffee break
11:15 – 11:45	Roundtable: elevator pitch of TUS research *Jullian Kosciessa*
11:45 – 12:45	Safety (+ consent and screening) *Lennart Verhagen*
12:45 – 13:30	*Lunch*
Lab Rotations **13:30 – 14:15** **14:30 – 15:15** **15:30 – 16:15** **16:30 – 17:15**	TUS water tank, protocols, and hardware *Kenneth van der Zee & Vivek Sharma* Targeting demo: neuronavigation + K-Plan *Maie Zörner & Sebastian Reichstein* TUS preparation: coupling and positioning *Marwan Engels & Carla Coca Coca* PRESTUS simulation demo *Julian Kosciessa & Margely Cornelissen*
17:15	*General closing of the day* *Lennart Verhagen*

Thursday, June 12: Best practices

09:30 – 10:10	Connectivity, plasticity, and state-dependency *Maie Zörner*
10:10 – 10:55	Target planning and engagement, MR-ARFI *Julian Kosciessa & Shota Hodono*
	Coffee break
11:15 – 12:15	TUS physics, measurements, and reporting *Elly Martin*
12:15 – 13:30	*Lunch* (consent and screening)
13:30 – 14:15	TUS in practice (cognitive task demo) *Vivek Sharma & Joana Pedroso de Faria*
14:30 – 15:15	Study design, confounds, and control *Nico Adelhöfer & Kenneth van der Zee*
15:30 – 16:15	US metrology – water tank *Stein Fekkes & Margely Cornelissen*
16:30 – 17:15	Device monitoring + TUS calculator *Lutz Tebbe & Martin Wimmers*
17:15	*General closing of the day*
19:30	*Dinner*

Friday, June 13: Your Study & Symposium

09:30 – 10:15	Designing your experiment *All lecturers*
10:15 – 11:00	Testing your experiment *All lecturers*
	Coffee break
11:15 – 12:00	Elly Martin (London) *Ultrasonic neuromodulation in the deep brain with high specificity*
12:00 – 12:45	Miriam Klein-Flügge (Oxford) *Neuromodulation and Neurocomputational Mechanisms of Decision-Making and Control*
	Lunch
13:30 – 14:15	David Maresca (Delft) *Ultrasound imaging of acoustic biomolecules and neural activity*
14:15 – 15:00	Sadaf Soloukey (Rotterdam) *Functional Ultrasound Imaging of the Human Brain*
	Coffee & Tea
15:30 – 16:15	Jean-Francois Aubry (Paris) *A 25 Year Journey in Transcranial Ultrasound and Ultrasonic Neuromodulation*
16:15 – 17:00	Physiological safety of Transcranial Ultrasound Panel Discussion: *Miriam Klein-Flügge, Jean-Francois Aubry, Elly Martin, Lennart Verhagen*
17:00	*Drinks*